**Claims:**

1. A method for forming a magnetic memory cell, comprising:

loading a semiconductor wafer into an etch process chamber, the semiconductor wafer having at least one masking layer, the at least one masking layer formed over a set of layers for forming the magnetic memory cell, the set of layers including a subset of layers, the subset of layers including at least two magnetic layers separated by an electron barrier layer and including an anti-magnetic layer; and

plasma etching through openings formed in the at least one masking layer, the plasma etching including flowing at least one plasma source gas into the etch process chamber, the at least one plasma source gas including HCl.

2. The method of claim 1 wherein the HCl is flowed at a rate at least equal to any other etchant gas for etching at least one of the subset of layers.

3. The method of claim 2 further comprising passivating the semiconductor wafer after the plasma etching by using at least one of water vapor plasma and ammonia plasma.

4. The method of claim 3 wherein the step of passivating comprises using at least one of a water vapor plasma and an ammonia plasma.

5. The method of claim 2 further comprising water rinsing the semiconductor wafer after the plasma etching.

6. The method of claim 2 wherein the subset of layers comprises at least one of Ni, Fe, Co, Ru and any combination thereof.

7. The method of claim 6 wherein the subset of layers comprises at least one of Pt, Ir, and Mn and any combination thereof.

8. The method of claim 7 wherein the subset of layers comprises aluminum oxide.

9. The method of claim 2 wherein the at least one masking layer comprises a layer of a resist and a layer of amorphous carbon.

10. The method of claim 2 wherein the at least one masking layer comprises a layer of a resist and a layer of a hydro-carbon polymer resin.

11. A method for plasma etching in a plasma reactor to provide a magnetic memory cell stack, comprising:

positioning a work piece in the plasma reactor, the work piece including at least one magnetic material layer selected from NiFe, CoFe, NiFeCo, and Ru;

flowing a plasma source material into the plasma reactor, the plasma source material including HCl;

generating a plasma from the plasma source material; and

exposing the work piece to the plasma to etch the at least one magnetic material layer.

12. The method of claim 11 wherein the work piece comprises an electron barrier material layer having aluminum oxide.

13. The method of claim 12 wherein the step of exposing the work piece to the plasma is to etch the electron barrier material layer.

14. The method of claim 11 wherein the work piece comprises an anti-magnetic material layer selected from PtMn and IrMn.

15. The method of claim 14 wherein the step of exposing the work piece to the plasma etches the anti-magnetic material layer.

16. For a process chamber configured to allow an operator thereof to select a gaseous mixture for etching a portion of a magnetic memory cell stack, the portion of the magnetic memory cell stack having two magnetic orientation material layers separated by a tunnel barrier layer and having an anti-magnetic material layer, the gaseous mixture comprising:

HCl as a main etchant gas to etch the portion of the magnetic memory cell stack.

17. The mixture of claim 16 wherein the two magnetic orientation material layers comprise at least one of NiFe, CoFe, NiFeCo, and Ru.

18. The mixture of claim 17 wherein the tunnel barrier layer comprises an aluminum oxide.

19. The mixture of claim 18 wherein the anti-magnetic material layer comprises at least one of PtMn and IrMn.

20. The mixture of claim 17 wherein the gaseous mixture further comprises at least one of HBr, $Cl_2$, $BCl_3$, Ar, $N_2$ and $O_2$.

21. A method for forming a magnetic memory cell, comprising:

loading a semiconductor wafer into a first etch process chamber, the semiconductor wafer having at least one masking layer, the at least one masking layer formed over a set of layers for forming the magnetic memory cell, the set of layers including a subset of layers, the subset of layers including at least two magnetic layers separated by an electron barrier layer and including an anti-magnetic layer, the subset of layers not including a diffusion barrier layer, the diffusion barrier layer located below the subset of layers;

first plasma etching the subset of layers through openings formed in the at least one masking layer, the first plasma etching including flowing a first plasma source gas into the first etch process chamber, the first plasma source gas including HCl;

removing the semiconductor wafer from the first etch process chamber;

loading the semiconductor wafer into a second etch process chamber; and

second plasma etching the diffusion barrier layer of the semiconductor wafer, the second plasma etching including flowing a second plasma source gas into the second etch process chamber, the second plasma source gas including a hydrogen and fluorine gas.

22. The method of claim 21 wherein the HCl is flowed at a rate at least equal to any other etchant gas for etching at least one layer of the subset of layers.

23. The method of claim 21 wherein the first etch process chamber and the second etch process chamber is selected from ECR, ICP, RIE, helical, triode, and MERIE process chamber.

24. The method of claim 22 wherein the first etch process chamber is a DPS process chamber.

25. The method of claim 21 wherein the hydrogen and fluorine gas is selected from $CHF_3$, $CH_2F_2$, and $CH_3F$.

26. A method for plasma etching in a plasma reactor to provide a magnetic memory cell stack, comprising:

positioning a work piece in the plasma reactor, the work piece including an anti-magnetic material layer selected from PtMn and IrMn;

flowing a plasma source material into the plasma reactor, the plasma source material including HCl;

generating a plasma from the plasma source material; and

exposing the work piece to the plasma to etch the anti-magnetic material layer.

27. The method of claim 26 wherein the work piece comprises an electron barrier material layer having aluminum oxide.

28. The method of claim 27 wherein the step of exposing the work piece to the plasma is to etch the electron barrier material layer.

29. The method of claim 26 wherein the work piece comprises at least one magnetic material layer selected from NiFe, CoFe, NiFeCo, and Ru.

30. The method of claim 29 wherein the step of exposing the work piece to the plasma etches the at least one magnetic material layer.